

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**East 81 Lake, Brookings County**  
**2102-F-21-R-48**  
**2015**



**Figure 1.** East 81 Lake, Brookings County

**Legal Description:** T109N-R52W-Sec. 7, 18

**Location from nearest town:** 4 miles south of Arlington, SD

**Surface Area:** 328 acres

**Meandered (Y/N):** yes

**OHWM elevation:** none set

**Outlet elevation:** none set

**Max. depth at outlet elevation:** 16.2 feet

**Observed water level:** full

**Contour map available (Y/N):** yes

**Watershed area:** no data

**Shoreline length:** no data

**Date set:** NA

**Date set:** NA

**Mean depth at outlet elevation:** 10.8 feet

**Lake volume:** 3,545 acre feet

**Date mapped:** 2011

**DENR beneficial use classifications:** no beneficial use classifications have been set for this water.

## Introduction

### General

East 81 Lake is located in Brookings County and is the northeast basin of what is legally known as Twin Lakes which is located on the west side of US Highway 81 in Kingsbury County. US Highway 81 separates this basin from the main lake, but it is believed that fish are able to travel through existing culverts under the highway.

### Ownership of Lake and Adjacent Lakeshore Properties

Although East 81 Lake is a portion of the Twin Lakes complex, the South Dakota Department of Game, Fish, and Parks (GFP) manages it as a unique fishery. Most of the shoreline lies within a Waterfowl Production Area (WPA) managed by the United States Fish and Wildlife Service (USFWS). The remainder of the shoreline is privately owned.

### Fishing Access

There is no boat ramp or other facilities on East 81 Lake. Small boats can be launched off a sandy shoreline on the northwest corner of the lake, but parking is limited. There is some shore fishing access within the WPA on the north shore and from the road right of way.

### Water Quality and Aquatic Vegetation

The water temperature during this year's lake survey was 26°C (78°F) and the water clarity was 226 cm (89 in) (Table 1). Submerged aquatic vegetation was found out to about 2.7 m (9 ft) of water.

**Table 1.** Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in East 81 Lake, Brookings County, 2006-2015.

<b>Year</b>	<b>Water Temp °C (°F)</b>	<b>Secchi Depth cm (in)</b>	<b>Observations/Comments (algae, aquatic vegetation, water quality, etc.)</b>
2015	26 (78)	226 (89)	Cattails
2014	22 (72)	218 (86)	Cattails
2012	23 (73)	119 (47)	Cattails, clasping leaf and sago pondweed
2010	23 (74)	56 (22)	Heavy northern water milfoil, sago, and clasping leaf
2008	25 (77)	100 (39)	Dense northern water milfoil, sago, and clasping leaf
2006	27 (79)	183 (72)	Northern water milfoil, sago, and clasping leaf pondweed

### Fish Community

East 81 Lake contains a fish community comprised of species typically found in large lakes in eastern South Dakota (Table 2). Yellow bullheads are only found in a few large lakes and common carp were first sampled in 2012 following a flood event that caused water to outflow to the Lake Sinai/Big Sioux River watershed.

**Table 2.** Fish species commonly found in East 81 Lake, Brookings County.

<b><i>Game Species</i></b>	<b><i>Other Species</i></b>
Walleye	Common Carp
Yellow Perch	White Sucker
Northern Pike	
White Bass	
Black Bullhead	
Yellow Bullhead	

**Fish Management**

East 81 Lake is managed as a walleye/yellow perch fishery, but fishing opportunities for northern pike, white bass, and large black and yellow bullheads also exist at times. The primary management strategy for walleye and yellow perch is stocking (Table 4). No fish kills have been documented on the lake since management activities were started.

**Table 3.** Fish kill history for East 81 Lake, Brookings County.

<b><i>Year</i></b>	<b><i>Severity</i></b>	<b><i>Comments</i></b>
		No fish kills have been observed or recorded

**Table 4.** Stocking history for East 81 Lake, Brookings County, 2006-2015.

<b><i>Year</i></b>	<b><i>Number</i></b>	<b><i>Species</i></b>	<b><i>Size</i></b>
2006	49,170	Walleye	Small Fingerling
2009	319,000	Yellow Perch	Small Fingerling
2011	50,560	Walleye	Small Fingerling
2013	49,000	Walleye	Small Fingerling
2014	487,000	Walleye	Fry
2015	23,040	Walleye	Small Fingerling

## Methods

East 81 Lake was sampled on August 14-15, 2015 with three overnight gill nets. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , and 2 in) monofilament netting.

## Results and Discussion

### Net Catch Results

White bass, walleye, yellow perch and black bullhead were the most abundant species sampled in the gill nets (Table 5). Walleye and white bass abundance increased significantly this year (Table 7). The majority of white bass sampled were sub-stock length (Table 6).

**Table 5.** Total catch from three overnight gill nets set in East 81 Lake, Brookings County, August 14-15, 2015.

<i>Species</i>	<i>#</i>	<i>%</i>	<i>CPUE</i> <sup>1</sup>	<i>80% C.I.</i>	<i>Mean CPUE*</i>	<i>PSD</i>	<i>RSD-P</i>	<i>Mean Wr</i>
White Bass	200	42.0	66.7	<u>+62.4</u>	18.1	100	74	99
Walleye	116	24.4	38.7	<u>+19.7</u>	26.0	21	13	91
Yellow Perch	97	20.4	32.3	<u>+12.2</u>	58.4	88	16	94
Black Bullhead	55	11.6	18.3	<u>+17.2</u>	19.0	60	7	--
Yellow Bullhead	5	1.1	1.7	<u>+2.1</u>	1.0	--	--	--
White Sucker	2	0.4	0.7	<u>+0.9</u>	0.3	--	--	--
Common Carp	1	0.2	0.3	<u>+0.4</u>	0.5	--	--	--

\*10 years (2006-2015)

**Table 6.** CPUE by length category for selected species sampled with gill nets in East 81 Lake, Brookings County, August 14-15, 2015.

<i>Species</i>	<i>Substock</i>	<i>Stock</i>	<i>S-Q</i>	<i>Q-P</i>	<i>P+</i>	<i>All sizes</i>	<i>80% C.I.</i>
White Bass	56.3	10.3	--	2.7	7.7	66.7	<u>+62.4</u>
Walleye	10.7	28.0	22.0	2.3	3.7	38.7	<u>+19.7</u>
Yellow Perch	--	32.3	4.0	23.0	5.3	32.3	<u>+12.2</u>
Black Bullhead	--	18.3	7.3	9.7	1.3	18.3	<u>+17.2</u>
Yellow Bullhead	--	1.7	--	0.7	1.0	1.7	<u>+2.1</u>
White Sucker	--	0.7	--	--	0.7	0.7	<u>+0.9</u>
Common Carp	--	0.3	--	0.3	--	0.3	<u>+0.4</u>

Length categories can be found in Appendix A.

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, RSD, RSD-P and mean Wr.

**Table 7.** Gill-net (GN) and trap-net (TN) CPUE for selected fish species sampled in East 81 Lake, Brookings County, 2006-2015.

<b>Species</b>	<b>Gear</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Black Bullhead	GN	--		8.0		4.0		49.0		34.7	18.3
	TN	57.8		81.2		4.7		657.1			
Common Carp	GN	--		--		--		1.0		1.7	0.3
	TN	--		--		--		11.8			
Northern Pike	GN	0.3		0.3		--		1.0		--	--
	TN	0.1		--		0.3		--			
Walleye	GN	35.3		22.0		40.0		13.0		6.7	38.7
	TN	2.3		1.3		1.5		2.8			
White Bass	GN	3.0		13.3		20.5		1.0		4.3	66.7
	TN	--		1.4		68.9		1.0			
White Sucker	GN	0.3		0.3		--		--		0.3	0.7
	TN	0.3		--		0.1		--			
Yellow Bullhead	GN	1.0		1.7		--		0.5		1.0	1.7
	TN	6.9		6.8		12.5		12.5			
Yellow Perch	GN	14.3		17.7		86.0		162.0		38.0	32.3
	TN	--		0.4		2.4		16.3			

## Walleye

### Management Objective

- maintain a walleye population with a total gill-net CPUE of at least 20

### Management Strategy

- stock small walleye fingerlings at the rate of 100/acre (32,800) as needed to achieve the management objective

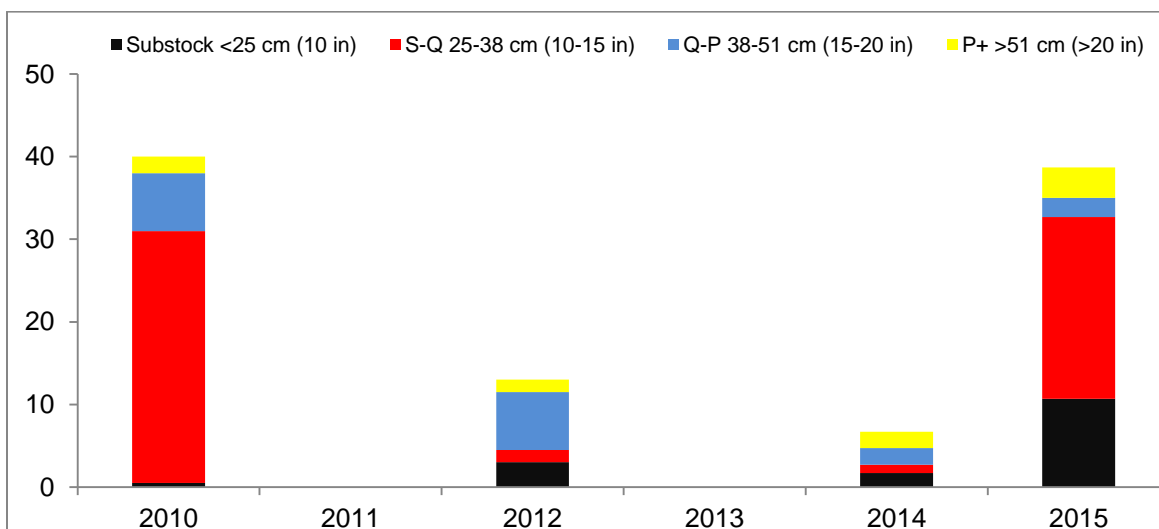
Walleye gill-net CPUE increased dramatically in 2015 (Table 8) and is once again well above the management objective. CPUE of stock length and greater walleye was 28 with the majority of those fish measuring 23 to 35 cm (~ 9-14 in) long and most likely originating from the 2013 and 2014 year classes. East 81, at times, has good natural recruitment (Figure 8, 2010 catch) so the origin of these fish is unknown. Small fingerlings were stocked in 2013 and fry in 2014, and most likely made a contribution.

**Table 8.** CPUE, PSD, RSD-P, and mean Wr for all walleyes sampled with gill nets in East 81 Lake, Brookings County, 2006-2015. Stocked years are shaded.

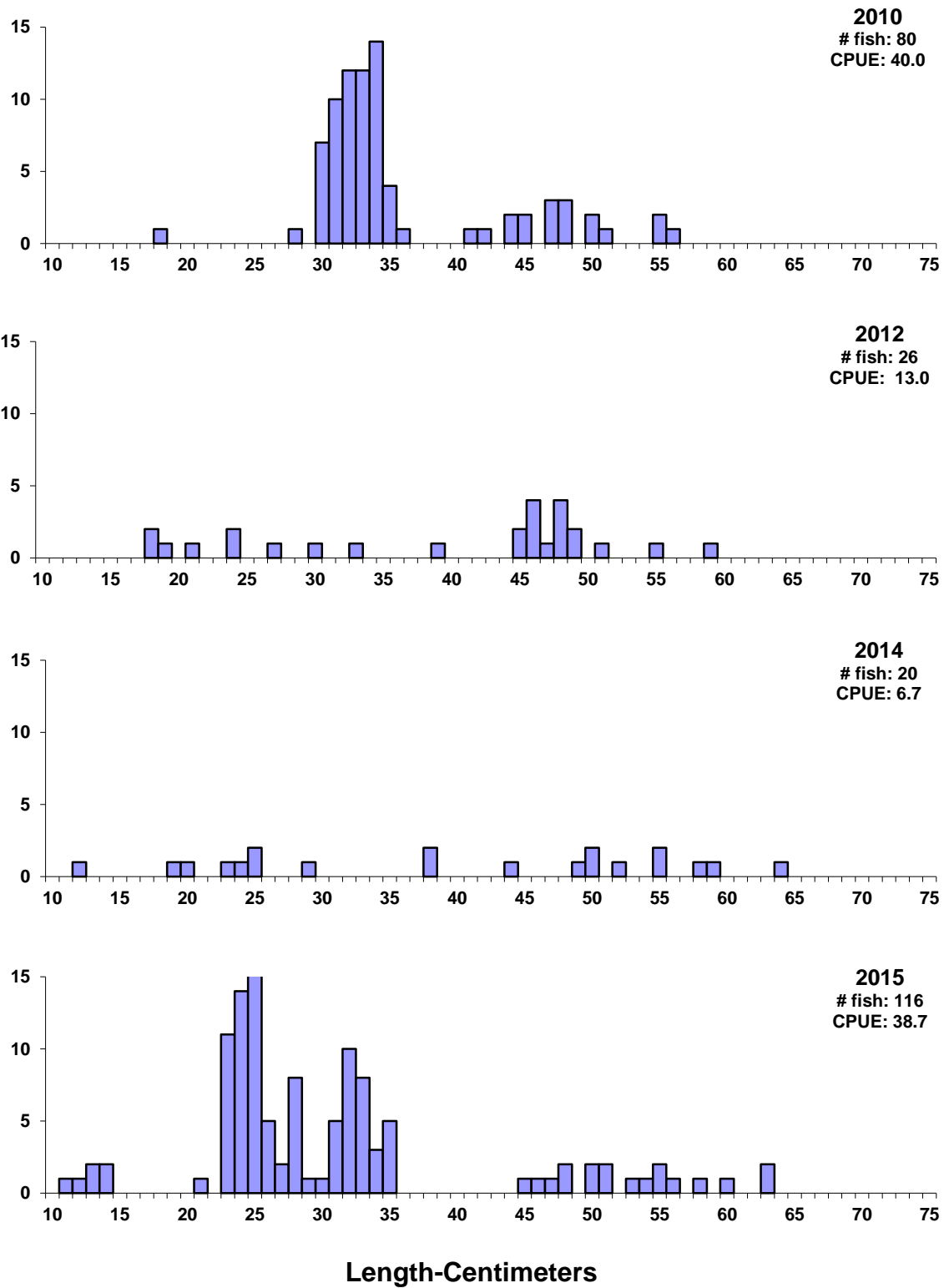
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>CPUE</b>	35.3		22.0		40.0		13.0		6.7	38.7
<b>PSD</b>	5		65		23		85		80	21
<b>RSD-P</b>	0		0		5		15		40	13
<b>Mean Wr</b>	87		96		97		93		89	91

**Table 9.** Walleyes stocked into East 81 Lake, Brookings County, 2006-2015.

Year	Number	Size
2006	49,170	Small Fingerling
2011	50,560	Small Fingerling
2013	49,000	Small Fingerling
2014	487,000	Fry
2015	23,040	Small Fingerling



**Figure 2.** CPUE by length category for walleye sampled with gill nets in East 81 Lake, Brookings County, 2010-2015.



**Figure 3.** Length frequency histograms for walleye sampled with gill nets in East 81 Lake, Brookings County, 2010, 2012, 2014 and 2015.

## **Yellow Perch**

### **Management Objective**

- maintain a yellow perch population with a total gill-net CPUE of at least 25

### **Management Strategy**

- stock yellow perch fingerlings at the rate of 500/acre (164,000) as needed to achieve the management objective

Yellow perch gill-net CPUE was similar to 2014 (Table 10) and exceeded the management objective. Growth is reasonably good with fish size increasing from 13-20 cm (5-8 in) long in 2014 to 20-25 cm (8-10 in) long in 2015 (Figures 4, 5). Although perch over 25 cm (10 in) are relatively uncommon in E81, several larger individuals 25-30 cm (10-12 in) were caught this summer.

**Table 10.** CPUE, PSD, RSD-P, and mean Wr for all yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2006-2015. Stocked years are shaded.

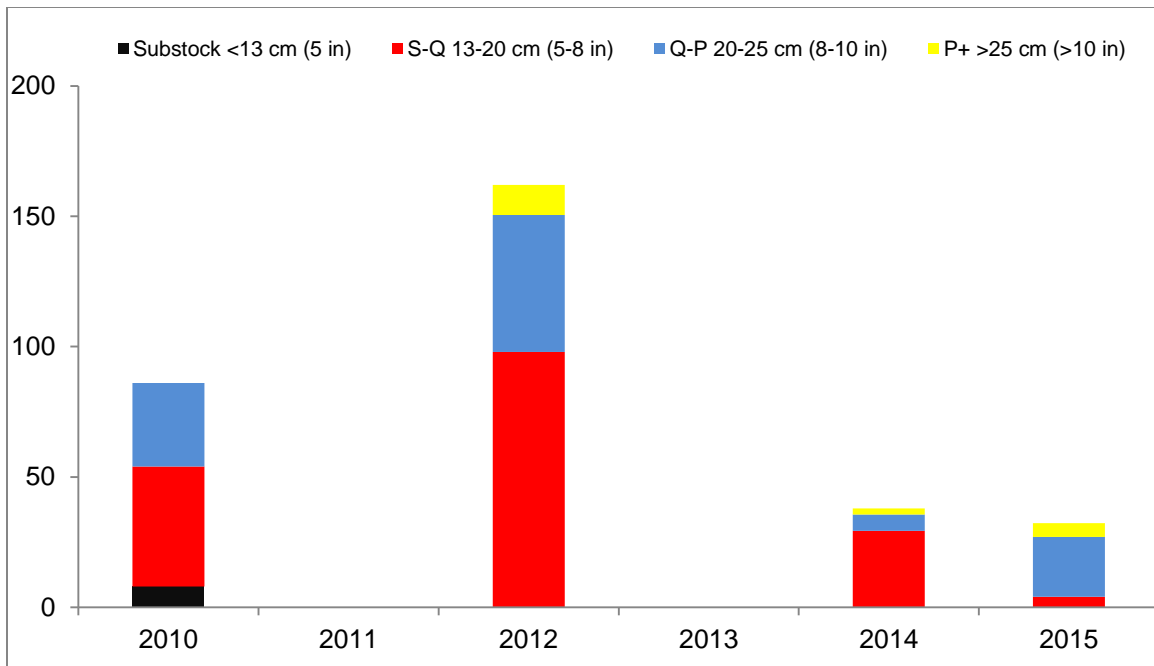
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>CPUE</b>	14.3		17.7		86.0		162.0		38.0	32.3
<b>PSD</b>	84		42		41		40		23	88
<b>RSD-P</b>	30		2		0		7		6	16
<b>Mean Wr</b>	116		111		101		92		96	94

**Table 11.** Yellow perch stocked into East 81 Lake, Brookings County, 2006-2015.

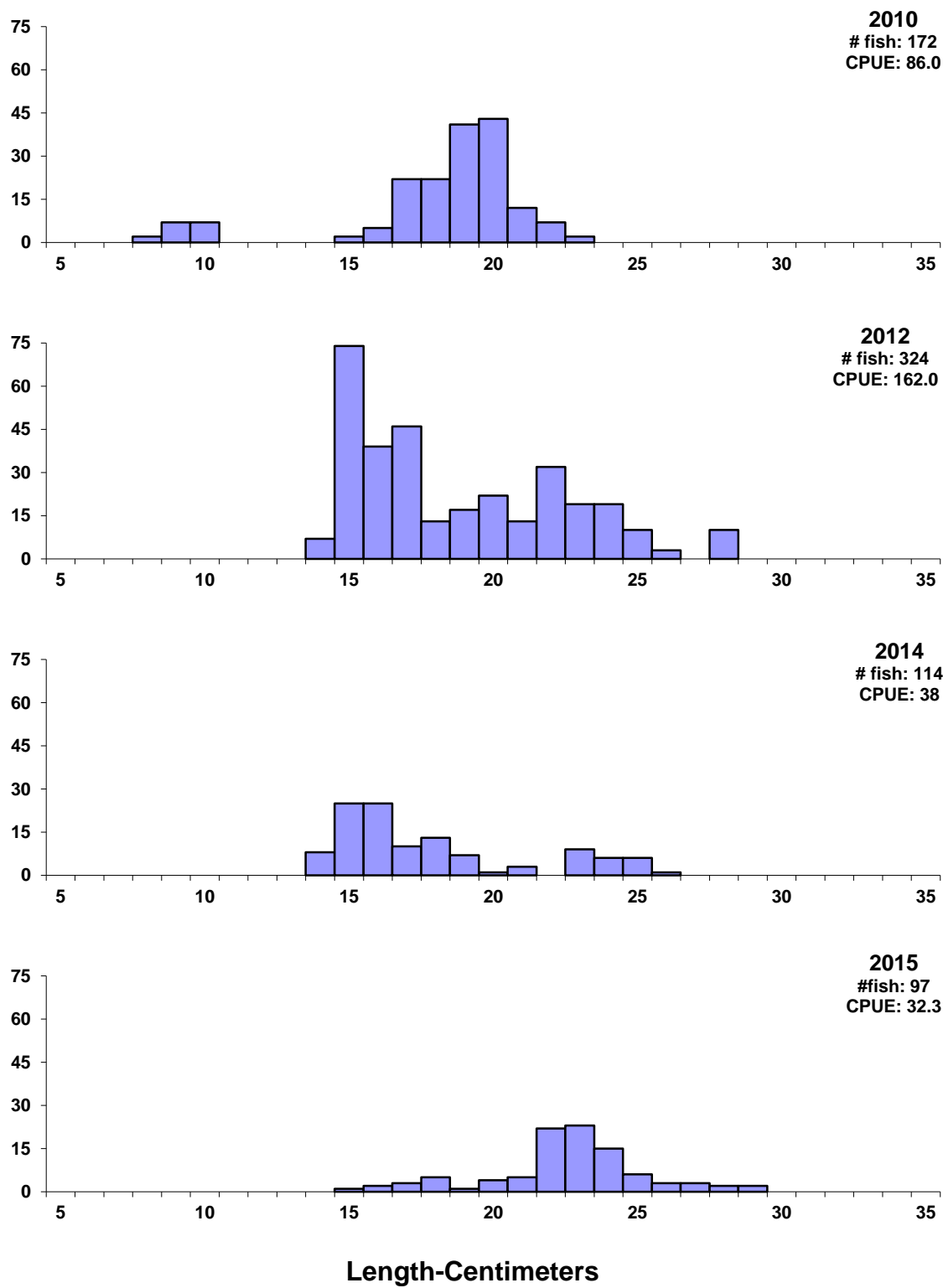
<b>Year</b>	<b>Number</b>	<b>Size</b>
2009	319,000	Small Fingerling

**Table 12.** Weighted mean length at capture (mm) for yellow perch captured in gill nets in East 81 Lake, Brookings County, 2010-2015. Sample size is in parentheses.

<b>Year</b>	<b>Age-1</b>	<b>Age-2</b>	<b>Age-3</b>	<b>Age-4</b>	<b>Age-5</b>	<b>Age-6</b>	<b>Age-7</b>	<b>Age-8</b>
2015 (96)	180 (11)	232 (72)	264 (9)	281 (4)	--	--	--	--
2014 (114)	165 (89)	233 (12)	245 (12)	265 (1)	--	--	--	--
2012 (324)	166 (200)	231 (121)	286 (3)	--	--	--	--	--
2010 (156)	191 (135)	218 (21)	--	--	--	--	--	--



**Figure 4.** CPUE by length category for yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2010-2015.



**Figure 5.** Length frequency histograms for yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2010, 2012, 2014 and 2015.



**Appendix A.** A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

**Catch Per Unit Effort (CPUE)** is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

**Proportional Stock Density (PSD)** is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

**Relative Stock Density (RSD-P)** is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters. (inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

**Relative weight (Wr)** is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.